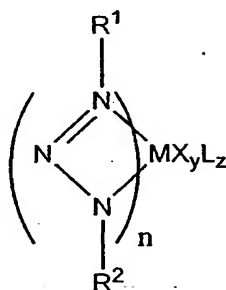


## Claims

What we claim is:

1. A polymerisation catalyst comprising
  - (1) a nitrogen-containing transition metal compound having the following Formula A, and



Formula A

- (2) an activating quantity of an activator compound selected from organoaluminium compounds and hydrocarbylboron compounds,
- 10 wherein in, Formula A, either (a)  $R^1$  and  $R^2$  are monovalent groups connected to the terminal nitrogen atoms of the triazene unit via carbon in said monovalent groups or (b)  $R^1$  and  $R^2$  integrally form a divalent group  $R^3$  bridging the terminal nitrogen atoms of the triazene unit via carbon atoms;
- the monovalent groups  $R^1$  and  $R^2$  and the divalent group  $R^3$  are independently selected
- 15 from (i) aliphatic hydrocarbon, (ii) alicyclic hydrocarbon, (iii) aromatic hydrocarbon, (iv) alkyl substituted aromatic hydrocarbon (v) heterocyclic groups and (vi) heterosubstituted derivatives of said groups (i) to (v);

M is a metal from Group 3 to 11 of the Periodic Table or a lanthanide metal; X is an anionic group, L is a neutral donor group; n is 1 or 2, y and z are independently zero or integers such that the number of X and L groups satisfy the valency and oxidation state of the metal M.

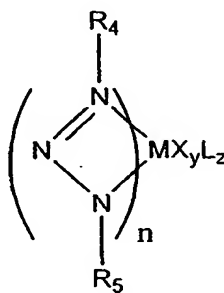
- 5 2. A polymerisation catalyst as claimed in Claim 1 wherein the monovalent groups  $R^1$  and  $R^2$  are selected from methyl, ethyl, ethylenyl, isopropyl, tert-butyl, adamantyl, cyclopentyl, cyclohexyl, phenyl, biphenyl, naphthyl, phenanthryl, anthryl, benzyl, tolyl, mesityl, 2,6-diisopropylphenyl and 2,4,6-triisopropyl, 2-pyridinyl, 3-pyridinyl, 2-thiophenyl, 2-furanyl, 2-pyrrolyl and 2-quinolinyl.
- 10 3. A polymerisation catalyst as claimed in Claim 1 wherein the divalent group  $R^3$  is formed by formal removal of a hydrogen atom from a group selected from methyl, ethyl, ethylenyl, isopropyl, tert-butyl, adamantyl, cyclopentyl, cyclohexyl, phenyl, biphenyl, naphthyl, phenanthryl, anthryl, benzyl, tolyl, mesityl, 2,6-diisopropylphenyl and 2,4,6-triisopropyl, 2-pyridinyl, 3-pyridinyl, 2-thiophenyl, 2-furanyl, 2-pyrrolyl and  
 15 2-quinolinyl.
4. A polymerisation catalyst as claimed in any one of the preceding Claims wherein  $R^1$ ,  $R^2$  and  $R^3$  are heterosubstituted derivatives of said groups (i), (ii), (iii), (iv) or (v) and wherein the hetero-substituent is selected from chloro, bromo, fluoro, iodo, nitro, amino, cyano, ether, hydroxyl and silyl, methoxy, ethoxy, phenoxy (i.e.  $-\text{OC}_6\text{H}_5$ ),  
 20 tolyloxy, xylyloxy, mesityloxy, dimethylamino, diethylamino, methylethylamino, thiomethyl, thiophenyl and trimethylsilyl.
5. A polymerisation catalyst as claimed in any one of the preceding Claims wherein the group  $R^1$ ,  $R^2$  or  $R^3$  is heterocyclic and the atom or atoms present in the rings as the heteroatom are selected from oxygen, nitrogen, sulphur, phosphorus and silicon.
- 25 6. A polymerisation catalyst as claimed in any one of Claims 1, 2, 4 or 5 wherein  $R^1$  and  $R^2$  are separate, identical groups.
7. A polymerisation catalyst as claimed in Claim 6 wherein  $R^1$  and  $R^2$  are alkyl groups.
8. A polymerisation catalyst as claimed in any one of the preceding Claims wherein  
 30 M is selected from Sc, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Fe, Ru, Co, Rh, Ir, Ni, Pd and Pt.
9. A polymerisation catalyst as claimed in any one of the preceding Claims wherein

the anionic group X is selected from halide, hydrocarbyl, carboxylate, oxide, amide, and alkoxide.

10. A polymerisation catalyst as claimed in any one of Claims 1 to 8 wherein X is a non-coordinating or weakly-coordinating anion.
- 5 11. A polymerisation catalyst as claimed in Claim 10 wherein X is selected from tetrafluoroborate, fluorinated aryl borate and triflate.
12. A polymerisation catalyst as claimed in any one of the preceding Claims wherein the activator compound (2) is an organoaluminium compounds selected from trimethylaluminium, triethylaluminium, tributylaluminium, tri-n-octylaluminium, 10 ethylaluminium dichloride, diethylaluminium chloride and an alumoxane, or a hydrocarbylboron compounds selected from dimethylphenylammoniumtetra(phenyl)borate, trityltetra(phenyl)borate, triphenylboron, dimethylphenylammonium tetra(pentafluorophenyl)borate, sodium tetrakis[(bis-3,5-trifluoromethyl)phenyl]borate,  $H^+(OEt_2)[(bis-3,5-$  15 trifluoromethyl)phenyl]borate, trityltetra(pentafluorophenyl)borate and tris(pentafluorophenyl) boron.
13. A polymerisation catalyst as claimed in any one of the preceding Claims wherein the catalyst is supported on a support material.
14. A polymerisation catalyst as claimed in Claim 13 wherein the support material is 20 selected from silica, alumina, zirconia, magnesia or a polymer or prepolymer.
15. A polymerisation catalyst as claimed in any one of the preceding Claims wherein the nitrogen-containing transition metal compound having the following Formula A is selected from  
 1,3-bis(2,6-diisopropylphenyl)triazenido zirconium dichloride  
 25 1,3-bis(2,6-diisopropylphenyl)triazenido titanium dichloride,  
 1,3-bis(adamantyl)triazenido titanium dichloride  
 1,3-bis(adamantyl)triazenido zirconium dichloride  
 Bis(1,3-diphenyltriazene)zirconium dichloride.THF  
 1,3-Bis(2,4,6-trimethylphenyl)triazenido zirconium dibenzyl  
 30 Bis-N,N-(2,6-diisopropylphenyl)triazenylphenyltriphenylphosphine nickel(II) and  
 Bis(1,3-diphenyltriazene)zirconium dichloride.THF.
16. A catalyst as claimed in any one of the preceding claims and further comprising

a catalyst selected from Ziegler-Natta catalyst, metallocene-based catalyst and heat-activated supported chromium oxide catalyst.

17. A process for the polymerisation and copolymerisation of 1-olefins comprising contacting the monomeric 1-olefin under polymerisation conditions with the polymerisation catalyst claimed in any one of the preceding Claims.
18. A process as claimed in Claim 17 wherein a monomer selected from ethylene, propylene, butene, hexene, and styrene is homopolymerised.
19. A process as claimed in Claim 17 wherein ethylene and or propylene are copolymerised with a comonomer selected from 1-olefin, acrylic acid ester, vinyl ester and vinyl aromatic compound.
20. A transition metal compound having the Formula C



Formula C

- wherein either (a)  $R^4$  and  $R^5$  are monovalent groups connected to the terminal nitrogen atoms of the triazene unit of Formula C via carbon in said monovalent groups or (b)  $R^4$  and  $R^5$  integrally form a divalent group  $R^6$  bridging the terminal nitrogen atoms of the triazene unit of Formula A via carbon atoms;
- the monovalent groups  $R^4$  and  $R^5$  and the divalent group  $R^6$  are independently selected from (i) aliphatic hydrocarbon, (ii) alicyclic hydrocarbon, (iii) alkyl substituted aromatic hydrocarbon (iv) heterocyclic groups and (v) heterosubstituted derivatives of said groups (i) to (iv);

- M is a metal from Group 3 to 11 of the Periodic Table or a lanthanide metal; X is an anionic group; L is a neutral donor group; n is 1 or 2; y and z are independently integers such that the number of X and L groups satisfy the valency and oxidation state of the metal M.

21. Propylene homopolymer or propylene copolymer having a weight average molecular weight in the range  $0.7 \times 10^6$  to  $2.0 \times 10^7$ .

22. Propylene homopolymer or propylene copolymer having a weight average molecular weight in the range  $1 \times 10^6$  to  $1.6 \times 10^7$ .

23. Propylene homopolymer or propylene copolymer having a weight average molecular weight in the range  $2 \times 10^6$  to  $1.20 \times 10^7$ .

5 24. A propylene copolymer as claimed in any one of Claims 21 to 23 comprising 0.01 to 20 weight % based on the total weight of copolymer of one or more olefins selected from ethylene and  $C_4$  to  $C_{12}$  1-olefins.

25. A propylene homopolymer or copolymer as claimed in any one of Claims 21 to 24 wherein the stereochemistry is predominantly that of atactic polypropylene.

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